heating and rapid cooling, cannot be done well and homogeneous amorphous surface could not be obtained.

EXAMPLE 9

Pulse duration was varied and in case the duration was shorter than 0.5 μs, the microcracks were observed on the surface of metal and/or partial metal dentures, so the corrosion resistance decreases essentially. And in case, the duration is over than 10μs, the non-homogeneous surface could be obtained. This relation is summarized as

$$\tau \approx k \cdot r^2/a, \qquad (1)$$

where r is an extrapolated penetration depth of the electrons in material, $a = \lambda/\rho \cdot c$ is thermal diffusivity , λ, ρ, c are thermal conductivity, density, and heat capacity, respectively. For most of materials the value of a belongs to the range from 0.06 (for Ti) to 1.12 cm^2/s (for Cu). Concerning the value of r, it belongs to the range (at electrons energy 20-40 keV) from 0.5–1.3 μm (for W) to 3.3 –9.3 μm (for Al), correspondingly.

The coefficient k depends on the material properties, namely it is defined by the relation between a and r. To provide a high efficiency of the surface heating, from one hand, and to decrease the thermal stresses defined by the temperature gradients in a surface layer from other hand, value of k is chosen by the following way:

a) for most of constructive metallic alloys (alloys on the base of Fe, Al, and Ti), the coefficient $k \approx 1 \div 5$.

b) In case of the materials having high temperature conductivity and for small value of penetration depth r (Cu, Mo< W and alloys based on them) the coefficient k should be equal $k \approx 10 \div 50$.

Using the Eq. 1 and taking into account the limitations of k one can obtain the range of the beam pulse duration $\tau \approx 0.5 \div 10$ μs

What is claimed is:

1. Pulsed Electron Beam System to use for the surface modification of the metal and/or partial metal dentures. The system is consisted with an explosive emission cathode, accelerating gap formed by the cathode and plasma anode, and an electron collector where the metal and/or partial metal dentures are fixed, which are placed into a guide magnetic field. The holder of the metal and/or partial metal dentures is made with metal materials offering cooling effect to the mentioned products.

2. The process to modify the surface of the metal and/or partial metal dentures using Pulsed Electron Beam Systems, the irradiated energy should be over than 0.1 J/cm^2 and the pulse repetition is lower than 100.

3. The metal and/or partial metal dentures which surface is modified using pulsed electron beam irradiation for polishing from as-cast to finished and corrosion resistance modified products.